

Computer Vision Syndrome among Medical Undergraduates at MRIMS, Hyderabad, Telangana

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Abstract

Context: Computer vision syndrome not only affects physical health but also affects the quality of life significantly. It also hampers productivity of work. *Aims:* To study the prevalence of symptoms of computer vision syndrome (CVS) among medical students. *Settings and design:* Institution based cross sectional study was carried out at MRIMS, Hyderabad. *Methods and material:* 164 Medical students fit as per inclusion and exclusion criteria were given self administered questionnaires. Only completely filled questionnaires were analyzed for presence of CVS. *Statistical analysis:* The data was analyzed using chi square for proportions and student's t test for mean values. *Results:* Though the use of VDU (87.8%) was very high but the awareness was seen only among 15.2% of the users. The most common symptom was eye strain (43.9%). Though the prevalence of symptoms of CVS was more but its association with working on VDUs was not found to be statistically significant for any of the symptoms. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant. Eyestrain and watering were found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. *Conclusion:* Though majority was using VDU, the level of awareness was very low. Prevalence of symptoms of CVS was very high.

Keywords: Eyestrain, headache, glare, redness, watering

Introduction

Now a days use of visual display units (VDUs) like desktop, laptop, tabs, smart phones etc has acquired an important part in our day to day life. It has now been considered as necessity rather than luxury. All adults working in offices use computers. All students use smart phones or laptops. Students must learn to use these visual display units for academic purposes. They have changed the today's pace of life. With all these advantages, there are disadvantages too. Increased and indiscriminate use can lead to a

number of health problems. The groups of ocular complaints caused due to computers are referred to as computer vision syndrome (CVS). It has been defined as "complex of eye and vision problems related to the activities which stress the near vision and which are experienced in relation to or during the use of computers"¹

The symptoms related to computer vision syndrome are eyestrain, headache, burning of eyes, neck and shoulder pain, blurred vision at distance, glare, colored haloes around light, flashes of light before eyes, redness, watering, photophobia, contact lens discomfort etc. they can be divided into categories like asthenopic, ocular surface related, visual and extra-ocular.²

It has been estimated that all over the world, around 60 million populations may have been suffering from computer vision syndrome. Incidence is estimated at around one million cases every year [3].

Computer vision syndrome not only affects physical health but also affects the quality of life significantly. It also hampers productivity of work.

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It has been stated that of all the patients attending the outpatient department of ophthalmology, nearly 14% are due to computer vision syndrome. Moreover it has been documented that these persons are not aware about the cause of the condition.⁴

The most common visual display units used by medical students are smart phone. They also experience symptoms of computer vision syndrome. But they may not be aware about the computer vision syndrome. Hence present study was carried out among randomly selected medical students from a medical college located in South India to study the prevalence and symptoms associated with computer vision syndrome.

Material and Methods:

Study design: Present study was Institution based cross sectional study

Settings: Present study was carried out at Malla Reddy Institute of Medical Sciences, Hyderabad

Study duration: The study duration was for four months from January 2018 to April 2018.

Ethical Considerations: Institutional Ethics Committee permission was obtained. Informed consent was taken from medical students.

Sample size:

Based on the findings of the previous studies, it was estimated that the CVS prevalence ranges from 75-90%.⁵

Hence taking prevalence of CVS as 90%, with 95% confidence interval and 5% absolute precision the sample size came out to be 139. Adding non response rate of 15% the sample size was rounded to 160. Finally we could study 164 students.

Following formula⁶ was used to calculate the sample size for the present study based on above estimates

$$\text{Sample size} = Z (1-\alpha/2)^2 \times p (1 - p) / d^2$$

$Z (1 - \alpha/2) =$ is standard normal variate = 1.96 (95% confidence interval)

$p =$ Expected proportion in population based on previous studies or pilot studies = 90%

$d =$ Absolute error or precision = 5%

Inclusion criteria:

1. Medical students belonging to final MBBS Part I & II

2. Medical students willing to participate in the present study
3. Apparently healthy students

Exclusion criteria:

1. Medical students not willing to participate in the present study
2. Already known cases of eye disease or any other severe health problem

Methodology:

Medical students belonging to final year MBBS of Part I and Part II were the study population for the present study. There were a total of 263 such students. All students were screened for presence of any eye diseases so that those with eye diseases or any other severe health problems can be excluded from the present study. This exclusion helped to remove the bias that the symptoms were not due to computer vision syndrome. During screening, 21 students were excluded who had some form of health problem or eye disease as per exclusion criteria.

Remaining students were explained the nature of the study and we asked them their verbal consent to participate in the present study. At this stage, 36 students did not consent to participate and hence were excluded. Thus at this stage there were 206 medical students who were fit for the present study and were ready to participate.

Each student was given self administered study questionnaire (which was prepared based on review of literature). They were asked to fill the details and consult in case of any doubt while answering the study questionnaire. At this stage while screening the questionnaires we found that 42 questionnaires were either not completely filled or were not legible. Hence these 42 were excluded. Thus finally we had 164 questionnaires left for final analysis which was more than the sample size calculated for the present study.

Statistical analysis:

The data was entered in the Microsoft Excel Worksheet. Statistical tests like Yate's corrected chi square were used for proportions and student's "t" test was used for mean values. Two tailed p value was considered and if it was more than 0.05, then it was taken as statistically not significant.

Results

Table 1 shows age and sex wise distribution of study subjects. Females were more than males. Majority were in the age group of 23-25 years followed by 20-22 years. In higher age range, males outnumbered females. This may be due the more failures among boys than girls in the medical curriculum.

Table 2 shows proportion of students using visual display units (VDU) (Computer/mobile/iPad) and exposure in mean years. Majority i.e. 87.8% were using some or the other form of VDU. Only 12.2% denied use of it. On an average the students were using the VDU since eight years and

their daily average use amounted to almost four hours per day.

Table 3 shows awareness about computer vision syndrome (CVS). Though the use of VDU was very high but the awareness was seen only among 15.2% of the users.

Table 4 shows symptoms distribution of CVS. The most common symptom was eye strain in 43.9% of the students followed by headache in 42.7%. Tired, burning eyes was seen in 31.7% of the students. Flashes of light before eyes were seen among least i.e. three students only.

Table 1: Age and sex wise distribution of study subjects

Age (years)	Male		Female		Total	
	Number	%	Number	%	Number	%
20-22	25	39.7	38	60.3	63	38.4
23-25	33	42.9	44	57.1	77	46.9
26-28	17	70.8	07	29.2	24	14.7
Total	75	45.7	89	54.3	164	100

Table 2: Proportion of students using visual display units (VDU) (Computer/mobile/iPad) and exposure in mean years

Students using visual display units	Number	%	Mean Exposure (years)	Mean hours of work per day
Yes	144	87.8	8.08±3.9	3.9±1.5
No	020	12.2		
Total	164	100		

Table 3: Awareness about computer vision syndrome (CVS)

Awareness about computer vision syndrome	Number	%
Yes	25	15.2
No	139	84.8
Total	164	100

Table 4: Symptoms distribution of CVS

Symptoms	Yes		No	
	Number	%	Number	%
Eyestrain	72	43.9	92	56.1
Headache	70	42.7	94	57.3
Tired, burning eyes	52	31.7	112	68.3
Neck and shoulder pain	40	24.4	124	75.6
Blurred vision at distance	54	32.9	110	67.1
Glare	10	6.1	154	93.9
Colored halos around light	09	5.5	155	94.5
Flashes of light before eyes	03	1.8	161	98.2
Redness	19	11.6	145	88.4
Watering	35	21.3	129	78.7
Photophobia	16	9.8	148	90.2
Contact lens discomfort	09	5.5	155	94.5

Table 5: Association of working on VDUs with various important symptoms of CVS

Symptoms		Working on VDUs		Chi square	P value
		Yes	No		
Eyestrain	Yes	65 (90.3%)	7 (9.7%)	0.3791	0.5381
	No	79 (85.9%)	13 (14.1%)		
Headache	Yes	62 (88.6%)	8 (11.4%)	0.0003116	0.9859
	No	82 (87.2%)	12 (12.8%)		
Tired, burning eyes	Yes	45 (88.6%)	7 (11.4%)	0.00661	0.9352
	No	99 (88.4%)	13 (11.6%)		
Neck & shoulder pain	Yes	35 (87.5%)	5 (12.5%)	0.05123	0.8209
	No	108 (87.8%)	15 (12.2%)		
Blurred vision at distance	Yes	51 (94.4%)	3 (5.6%)	2.455	0.1172
	No	93 (84.5%)	17 (15.5%)		
Watering	Yes	33 (94.3%)	2 (5.7%)	1.088	0.2985
	No	110 (85.9%)	18 (14.1%)		

Table 6: Association of exposure to VDU (months) with various important symptoms of CVS

Symptoms		Total number (N)	Mean exposure to VDU (months)	T value	P value
Eyestrain	Yes	65	95.87±48.11	0.3931	0.6948
	No	79	92.82±44.82		
Headache	Yes	62	93.00±49.10	0.3537	0.7241
	No	82	95.75±43.89		
Tired, burning eyes	Yes	45	100.08±43.80	0.9683	0.3345
	No	99	92.06±47.05		
Neck & shoulder pain	Yes	35	101.77±50.75	1.0629	0.2896
	No	108	92.25±44.45		
Blurred vision at distance	Yes	51	97.80±46.52	0.6305	0.5294
	No	93	92.73±45.95		
Watering	Yes	33	105.93±54.16	1.6220	0.1070
	No	110	91.18±43.06		

Table 7: Association of working on VDU per day (hours) with various important symptoms of CVS

Symptoms		Total number (N)	Mean duration of working on VDU per day (hours)	T value	P value
Eyestrain	Yes	65	4.27±1.48	2.1308	0.0348
	No	79	3.72±1.59		
Headache	Yes	62	3.91±1.58	0.1853	0.8532
	No	82	3.96±1.62		
Tired, burning eyes	Yes	45	4.15±1.56	1.0766	0.2835
	No	99	3.84±1.62		
Neck & shoulder pain	Yes	35	4.08±1.60	0.5757	0.5658
	No	108	3.9±1.61		
Blurred vision at distance	Yes	51	4.13±1.61	1.0827	0.2809
	No	93	3.83±1.58		
Watering	Yes	33	4.45±1.57	2.0455	0.0427
	No	110	3.80±1.61		

Table 5 shows association of working on VDUs with various important symptoms of CVS. Though the prevalence of symptoms of CVS was more but its association with working on VDUs was not found to be statistically significant for any of the symptoms.

Table 6 shows association of exposure to VDU (months) with various important symptoms of CVS. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant.

Table 7 shows association of working on VDU per day (hours) with various important symptoms of CVS. Eyestrain was found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. Similar findings were observed for complaint like watering. But other symptoms did not show statistically significant difference.

Discussion

Majority were in the age group of 23-25 years followed by 20-22 years. In higher age range, males outnumbered females. This may be due the more failures among boys than girls in the medical curriculum. Majority i.e. 87.8% were using some or the other form of VDU. Only 12.2% denied use of it. On an average the students were using the VDU since eight years and their daily average use amounted to almost four hours per day. Though the use of VDU was very high but the awareness was seen only among 15.2% of the users. The most common symptom was eye strain in 43.9% of the students followed by headache in 42.7%. Tired, burning eyes was seen in 31.7% of the students. Flashes of light before eyes were seen among least i.e. three students only. Though the prevalence of symptoms of CVS was more but its association with working on VDUs was not found to be statistically significant for any of the symptoms. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant. Eyestrain was found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. Similar findings were observed for complaint like watering. But other symptoms did not show statistically significant difference.

Ranasinghe P et al⁷ in their study among 2210 subjects the mean age was 30.8 years. Majority were males. Prevalence of CVS found in their study was 67.4%. Females were 1.28 times more likely to develop CVS than males. The risk of CVS was 1.07 times more in subjects with longer duration of occupation. Daily users were 1.1 times more at risk of CVS. The odds were 4.49 for those with already having any eye disease. Of all the factors they found that only longer duration of occupation and already having eye disease were significant risk factors of CVS. Whereas in our study we found that working for more than four hours per day was a significant risk factor.

Soumya HV et al⁸ in their study noted that 83.5% of the subjects told that they have vision related problems. We found that it was 43.9%. Because their study was carried out among daily computer users and our study was among medical students. That is why we reported lesser prevalence of CVS. The authors noted that there was association between longer duration of computer which is similar to the present study finding. The awareness level was more in their study i.e. 38.8% compared to only 15.2% in the present study.

Noreen K et al⁹ found that mean age was 20.16 years among 198 respondents. The prevalence of symptoms of CVS was 67.2% which is more than the present study of 43.9%. The authors stated that the use of computers for more than four hours was significant risk factors for symptoms of CVS which is similar to the present study findings.

Assefa NL¹⁰ carried out a study among 304 bank workers who were regularly using computer. They found that the prevalence of CVS was 73% in their study. The prevalence of blurred vision was 42.4% which is higher than present study finding (32.9%). The prevalence of headache was 23% which is lower than the present study finding (42.7%). They noted that risk of CVS was 2.3 times more among those who were not sitting properly. The risk of CVS was two times more who were using computer continuously for more than 20 minutes. We also found that using computer for more than four hours a day was significant risk factor for CVS.

Al Dokhayel S et al¹¹ reported that prevalence of headache was 42.1% which is similar to our finding of 42.7%. They reported lesser prevalence of neck and shoulder pain (11.8%) whereas we found it almost doubles i.e. 24.4%. the authors found that using the device for more than five hours was a significant risk factor which is similar to our finding.

Reddy SC et al¹² studied 795 students of age 18-25 years in Malaysia. They reported a very high prevalence of symptoms of 89.9% while we reported highest rate of 43.9%. But they showed that headache was present only in 19.7% whereas we found that headache was present in slightly more proportions i.e. 42.7%. Their prevalence of eye strain was also low i.e. 16.4% compared to our 43.9%. Like our finding of using computer for more than four hours authors also noted use of device for more than two hours per day was a significant risk factor.

Al Rashidi SH et al¹³ studied 634 students whose average age was 21 years. In their study males were the majority but in our study females were the majority. The authors also reported like present study finding that use of gadget for more than 2-4 hours was a significant risk factor for CVS.

Mowatt L et al¹⁴ carried out a study among 499 students. Like in the present study, majority were females. Neck pain was reported by 75.1% of students in their study while our 24.4% students reported neck and shoulder pain. Reported eye strain was also more in their study (67%) compared to present study (43.9%).

Logaraj M et al¹⁵ found a prevalence of 81.9% of CVS among engineering students and 78.6%

among medical students. The risk of developing red eye was 1.2 times more among students who used the device continuously for 4-6 hours. We also found that continuous use of device for more than four hours was a significant risk factor.

Conclusion

The prevalence of symptoms of computer vision syndrome was high in the present study. Though majority of medical students were using some form of visual display units, the awareness related to the occurrence of computer vision syndrome was very low. Using the device for more than four hours per day was a significant risk factor for development of symptoms of computer vision syndrome. Hence medical students should be made aware about the risk of computer vision syndrome. They should be altered to reduce the use.

Key messages: As the awareness of CVS was very low, it is necessary that medical students be made aware of CVS and also counseled regarding use of VDUs appropriately so that their efficiency can be preserved for patient welfare.

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